

U.S. Patent Application Serial No. 10/657,192
Response filed July 12, 2006
Reply to OA dated March 13, 2006

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1 - 10 (Canceled)

Claim 11 (Currently Amended)): The vacuum apparatus according to ~~claim 9~~ claim 15,
wherein said plasma generator comprises:

an ionization chamber;

a coil wound around said ionization chamber;

a first electrode disposed in an opening of said ionization chamber; and

a second electrode disposed farther from said ionization chamber than said first electrode,

wherein said plasma generator is an ion gun, and gas supplied to said ionization chamber
forms plasma in an alternating current field formed by alternating current flowing through said coil,
and positive ions extracted from said plasma by said first and second electrodes are released into said
vacuum chamber.

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Claim 12 (Currently Amended): The vacuum apparatus according to ~~claim 10~~ claim 11,
further comprising an electron generator for emitting electrons,

wherein when plasma is regenerated due to disappearance of said plasma, a voltage higher
than that of said vacuum chamber is applied to said second electrode in order to attract said electrons
emitted from said electron generator to said ionization chamber.

Claim 13 (Original): A method of vacuum processing comprising the steps of:

ionizing gas supplied to an ionization chamber by applying an alternating current field to said
gas to generate plasma;

applying a positive voltage to a first electrode disposed in the vicinity of an opening of said
ionization chamber;

applying negative voltage to a second electrode disposed farther from said ionization
chamber than said first electrode;

releasing positive ions into a vacuum chamber, said positive ions being extracted from said
plasma by an electric field formed by said first and second electrodes,

releasing electrons from an electron generator into said vacuum chamber in order to
neutralize a flow of said positive ions by applying said electrons; and

irradiating said neutralized positive ions to a target object disposed inside said vacuum
chamber,

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wherein when plasma is regenerated due to disappearance of said plasma, said electrons emitted from said electron generator are attracted into said ionization chamber by applying a voltage higher than that of said vacuum chamber to said second electrode.

Claim 14 (Canceled).

Claim 15 (New) A vacuum apparatus comprising:

a vacuum chamber;

an RF source;

a plasma generator;

a detecting device for detecting disappearance of plasma; and

first and second variable inductance elements,

wherein the first variable inductance element comprises:

a first main winding, and

a first control winding magnetically coupled to the first main winding,

wherein the second variable inductance element comprises:

a second main winding, and

a second control winding magnetically coupled to the first main winding,

wherein the first and second main windings are controlled based on a magnitude of direct current flowing through the first and second control windings respectively,

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wherein the RF source is connected to the plasma generator via the first main winding and the RF source is connected to ground voltage via the second main winding,

wherein the plasma generator generates plasma by RF voltage outputted from the RF source, and

wherein when the disappearance of plasma is detected by the detecting device, the direct current flowing through the second control winding is decreased in order to increase the inductance of the second main winding larger than its inductance when plasma is maintained, and then, the RF voltage outputted to the plasma generator is increased.

Claim 16 (New): The vacuum apparatus according to claim 15, wherein when the plasma is maintained, magnitude of the inductance of the first main winding is controlled by the direct current flowing through the first control winding.